03495206
SEQUENCE LISTING

<110> BOURSAUX-EUDE, CAROLINE
      GUISO-MACLOUF, NICOLE

<120> POLYPEPTIDES CONTAINING POLYMORPHISMS OF THE REPEATED
      REGIONS OF PERTACTIN IN BORDETELLA PERTUSSIS,
      BORDETELLA PARAPERTUSSIS, AND BORDETELLA
      BRONCHISEPTICA, THEIR USE IN DIAGNOSTICS, AND IN
      IMMUNOGENIC COMPOSITIONS

<130> 03495-0206-00000

<140> 09/855,754
<141> 2001-05-16

<150> 60/206,969
<151> 2000-05-25

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<170> PatentIn Ver. 2.1

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Leu Arg Ala Ser Arg Leu Glu Asn Asp Phe Lys Val Ala Gly Ser Asp
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Gly Pro Val Leu Asp Gly Trp Tyr Gly Val Asp Val Ser Asp Ser Ser
    290             295             300

Val Glu Leu Ala Gln Ser Ile Val Glu Ala Pro Glu Leu Gly Ala Ala
305             310             315             320

Ile Arg Val Gly Arg Gly Ala Arg Val Thr Val Ser Gly Gly Ser Leu
            325             330             335

Ser Ala Pro His Gly Asn Val Ile Glu Thr Gly Gly Ala Arg Arg Phe
            340             345             350

Ala Pro Gln Ala Ala Pro Leu Ser Ile Thr Leu Gln Ala Gly Ala His
        355             360             365

Ala Gln Gly Lys Ala Leu Leu Tyr Arg Val Leu Pro Glu Pro Val Lys
    370             375             380

Leu Thr Leu Thr Gly Gly Ala Asp Ala Gln Gly Asp Ile Val Ala Thr
385             390             395             400

Glu Leu Pro Ser Ile Pro Gly Thr Ser Ile Gly Pro Leu Asp Val Ala
            405             410             415

Leu Ala Ser Gln Ala Arg Trp Thr Gly Ala Thr Arg Ala Val Asp Ser
            420             425             430

Leu Ser Ile Asp Asn Ala Thr Trp Val Met Thr Asp Asn Ser Asn Val
            435             440             445

Gly Ala Leu Arg Leu Ala Ser Asp Gly Ser Val Asp Phe Gln Gln Pro
    450             455             460

Ala Glu Ala Gly Arg Phe Lys Val Leu Thr Val Asn Thr Leu Ala Gly
465             470             475             480

Ser Gly Leu Phe Arg Met Asn Val Phe Ala Asp Leu Gly Leu Ser Asp
            485             490             495
```

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Lys Leu Val Val Met Gln Asp Ala Ser Gly Gln His Arg Leu Trp Val
        500   505   510

Arg Asn Ser Gly Ser Glu Pro Ala Ser Ala Asn Thr Leu Leu Leu Val
        515   520   525

Gln Thr Pro Arg Gly Ser Ala Ala Thr Phe Thr Leu Ala Asn Lys Asp
    530   535   540

Gly Lys Val Asp Ile Gly Thr Tyr Arg Tyr Arg Leu Ala Ala Asn Gly
545   550   555   560

Asn Gly Gln Trp Ser Leu Val Gly Ala Lys Ala Pro Pro Ala Pro Lys
            565   570   575

Pro Ala Pro Gln Pro Gly Pro Gln Pro Pro Gln Pro Pro Gln Pro Gln
            580   585   590

Pro Glu Ala Pro Ala Pro Gln Pro Pro Ala Gly Arg Glu Leu Ser Ala
        595   600   605

Ala Ala Asn Ala Ala Val Asn Thr Gly Gly Val Gly Leu Ala Ser Thr
    610   615   620

Leu Trp Tyr Ala Glu Ser Asn Ala Leu Ser Lys Arg Leu Gly Glu Leu
625   630   635   640

Arg Leu Asn Pro Asp Ala Gly Gly Ala Trp Gly Arg Gly Phe Ala Gln
            645   650   655

Arg Gln Gln Leu Asp Asn Arg Ala Gly Arg Arg Phe Asp Gln Lys Val
            660   665   670

Ala Gly Phe Glu Leu Gly Ala Asp His Ala Val Ala Val Ala Gly Gly
        675   680   685

Arg Trp His Leu Gly Gly Leu Ala Gly Tyr Thr Arg Gly Asp Arg Gly
        690   695   700

Phe Thr Gly Asp Gly Gly Gly His Thr Asp Ser Val His Val Gly Gly
705   710   715   720

Tyr Ala Thr Tyr Ile Ala Asp Ser Gly Phe Tyr Leu Asp Ala Thr Leu
            725   730   735

Arg Ala Ser Arg Leu Glu Asn Asp Phe Lys Val Ala Gly Ser Asp Gly
            740   745   750

Tyr Ala Val Lys Gly Lys Tyr Arg Thr His Gly Val Gly Ala Ser Leu
            755   760   765

Glu Ala Gly Arg Arg Phe Thr His Ala Asp Gly Trp Phe Leu Glu Pro
    770   775   780

Gln Ala Glu Leu Ala Val Phe Arg Ala Gly Gly Gly Ala Tyr Arg Ala
785   790   795   800

Ala Asn Gly Leu Arg Val Arg Asp Glu Gly Gly Ser Ser Val Leu Gly
            805   810   815

Arg Leu Gly Leu Glu Val Gly Lys Arg Ile Glu Leu Ala Gly Gly Arg
            820   825   830

Gln Val Gln Pro Tyr Ile Lys Ala Ser Val Leu Gln Glu Phe Asp Gly
            835   840   845

Ala Gly Thr Val His Thr Asn Gly Ile Ala His Arg Thr Glu Leu Arg
    850   855   860

Gly Thr Arg Ala Glu Leu Gly Leu Gly Met Ala Ala Ala Leu Gly Arg
865   870   875   880

Gly His Ser Leu Tyr Ala Ser Tyr Glu Tyr Ser Lys Gly Pro Lys Leu
            885   890   895

Ala Met Pro Trp Thr Phe His Ala Gly Tyr Arg Tyr Ser Trp
            900   905   910

<210> 6
<211> 922
<212> PRT
<213> Bordetella parapertussis

<400> 6
Met Asn Met Ser Leu Ser Arg Ile Val Lys Ala Ala Pro Leu Arg Arg
  1   5   10   15

Thr Thr Leu Ala Met Ala Leu Gly Ala Leu Gly Ala Ala Pro Ala Ala
            20   25   30

Tyr Ala Asp Trp Asn Asn Gln Ser Ile Ile Lys Ala Gly Glu Arg Gln
        35   40   45

His Gly Ile His Ile Lys Gln Ser Asp Gly Ala Gly Val Arg Thr Ala
    50   55   60

Thr Gly Thr Thr Ile Lys Val Ser Gly Arg Gln Ala Gln Gly Val Leu
 65   70   75   80

Leu Glu Asn Pro Ala Ala Glu Leu Arg Phe Gln Asn Gly Ser Val Thr
            85   90   95

Ser Ser Gly Gln Leu Phe Asp Glu Gly Val Arg Arg Phe Leu Gly Thr
            100   105   110

Val Thr Val Lys Ala Gly Lys Leu Val Ala Asp His Ala Thr Leu Ala
        115   120   125

Asn Val Ser Asp Thr Arg Asp Asp Asp Gly Ile Ala Leu Tyr Val Ala
    130   135   140

Gly Glu Gln Ala Gln Ala Ser Ile Ala Asp Ser Thr Leu Gln Gly Ala
145   150   155   160

Gly Gly Val Arg Val Glu Arg Gly Ala Asn Val Thr Val Gln Arg Ser
            165   170   175

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Thr Ile Val Asp Gly Gly Leu His Ile Gly Thr Leu Gln Pro Leu Gln
            180               185               190

Pro Glu Asp Leu Pro Pro Ser Arg Val Val Leu Gly Asp Thr Ser Val
            195               200               205

Thr Ala Val Pro Ala Ser Gly Ala Pro Ala Ala Val Phe Val Phe Gly
    210               215               220

Ala Asn Glu Leu Thr Val Asp Gly Gly His Ile Thr Gly Gly Arg Ala
225               230               235               240

Ala Gly Val Ala Ala Met Asp Gly Ala Ile Val His Leu Gln Arg Ala
            245               250               255

Thr Ile Arg Arg Gly Asp Ala Pro Ala Gly Gly Ala Val Pro Gly Gly
            260               265               270

Ala Val Pro Gly Gly Ala Val Pro Gly Gly Phe Gly Pro Leu Leu Asp
            275               280               285

Gly Trp Tyr Gly Val Asp Val Ser Asp Ser Thr Val Asp Leu Ala Gln
    290               295               300

Ser Ile Val Glu Ala Pro Gln Leu Gly Ala Ala Ile Arg Ala Gly Arg
305               310               315               320

Gly Ala Arg Val Thr Val Ser Gly Gly Ser Leu Ser Ala Pro His Gly
            325               330               335

Asn Val Ile Glu Thr Gly Gly Gly Ala Arg Arg Phe Pro Pro Pro Ala
            340               345               350

Ser Pro Leu Ser Ile Thr Leu Gln Ala Gly Ala Arg Ala Gln Gly Arg
            355               360               365

Ala Leu Leu Tyr Arg Val Leu Pro Glu Pro Val Lys Leu Thr Leu Ala
    370               375               380

Gly Gly Ala Gln Gly Gln Gly Asp Ile Val Ala Thr Glu Leu Pro Pro
385               390               395               400

Ile Pro Gly Ala Ser Ser Gly Pro Leu Asp Val Ala Leu Ala Ser Gln
            405               410               415

Ala Arg Trp Thr Gly Ala Thr Arg Ala Val Asp Ser Leu Ser Ile Asp
            420               425               430

Asn Ala Thr Trp Val Met Thr Asp Asn Ser Asn Val Gly Ala Leu Arg
            435               440               445

Leu Ala Ser Asp Gly Ser Val Asp Phe Gln Gln Pro Ala Glu Ala Gly
    450               455               460

Arg Phe Lys Val Leu Met Val Asp Thr Leu Ala Gly Ser Gly Leu Phe
465               470               475               480

Arg Met Asn Val Phe Ala Asp Leu Gly Leu Ser Asp Lys Leu Val Val
            485               490               495
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Met Arg Asp Ala Ser Gly Gln His Arg Leu Trp Val Arg Asn Ser Gly
              500   505   510

Ser Glu Pro Ala Ser Gly Asn Thr Met Leu Leu Val Gln Thr Pro Arg
              515   520   525

Gly Ser Ala Ala Thr Phe Thr Leu Ala Asn Lys Asp Gly Lys Val Asp
              530   535   540

Ile Gly Thr Tyr Arg Tyr Arg Leu Ala Ala Asn Gly Asn Gly Gln Trp
545   550   555   560

Ser Leu Val Gly Ala Lys Ala Pro Pro Ala Pro Lys Pro Ala Pro Gln
              565   570   575

Pro Gly Pro Gln Pro Gly Pro Gln Pro Gln Pro Pro Gln Pro Pro
              580   585   590

Gln Pro Pro Gln Pro Pro Gln Pro Pro Gln Arg Gln Pro Glu Ala Pro
              595   600   605

Ala Pro Gln Pro Pro Ala Gly Arg Glu Leu Ser Ala Ala Ala Asn Ala
              610   615   620

Ala Val Asn Thr Gly Gly Val Gly Leu Ala Ser Thr Leu Trp Tyr Ala
625   630   635   640

Glu Ser Asn Ala Leu Ser Lys Arg Leu Gly Glu Leu Arg Leu Asn Pro
              645   650   655

Asp Ala Gly Gly Ala Trp Gly Arg Gly Phe Ala Gln Arg Gln Gln Leu
              660   665   670

Asp Asn Arg Ala Gly Arg Arg Phe Asp Gln Lys Val Ala Gly Phe Glu
              675   680   685

Leu Gly Ala Asp His Ala Val Ala Val Ala Gly Gly Arg Trp His Leu
              690   695   700

Gly Gly Leu Ala Gly Tyr Thr Arg Gly Asp Arg Gly Phe Thr Gly Asp
705   710   715   720

Gly Gly Gly His Thr Asp Ser Val His Val Gly Gly Tyr Ala Thr Tyr
              725   730   735

Ile Ala Asn Ser Gly Phe Tyr Leu Asp Ala Thr Leu Arg Ala Ser Arg
              740   745   750

Leu Glu Asn Asp Phe Lys Val Ala Gly Ser Asp Gly Tyr Ala Val Lys
              755   760   765

Gly Lys Tyr Arg Thr His Gly Val Gly Val Ser Leu Glu Ala Gly Arg
              770   775   780

Arg Phe Ala His Ala Asp Gly Trp Phe Leu Glu Pro Gln Ala Glu Leu
785   790   795   800

Ala Val Phe Arg Val Gly Gly Gly Ala Tyr Arg Ala Ala Asn Gly Leu

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              805                    810                    815
Arg Val Arg Asp Glu Gly Gly Ser Ser Val Leu Gly Arg Leu Gly Leu
         820                    825                    830

Glu Val Gly Lys Arg Ile Glu Leu Ala Gly Gly Arg Gln Val Gln Pro
         835                    840                    845

Tyr Ile Lys Ala Ser Val Leu Gln Glu Phe Asp Gly Ala Gly Thr Val
     850                    855                    860

Arg Thr Asn Gly Ile Ala His Arg Thr Glu Leu Arg Gly Thr Arg Ala
865                    870                    875                    880

Glu Leu Gly Leu Gly Met Ala Ala Ala Leu Gly Arg Gly His Ser Leu
         885                    890                    895

Tyr Ala Ser Tyr Glu Tyr Ser Lys Gly Pro Lys Leu Ala Met Pro Trp
         900                    905                    910

Thr Phe His Ala Gly Tyr Arg Tyr Ser Trp
         915                    920
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<210> 7
<211> 51
<212> PRT
<213> Bordetella bronchiseptica

<400> 7
Gln Arg Ala Thr Ile Arg Arg Gly Asp Ala Pro Ala Gly Gly Ala Val
  1               5                  10                     15

Pro Gly Gly Ala Val Pro Gly Gly Ala Val Pro Gly Gly Phe Gly Pro
              20                  25                     30

Leu Leu Asp Gly Trp Tyr Gly Val Asp Val Ser Asp Ser Thr Val Asp
         35                  40                     45

Leu Ala Gln
     50
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<210> 8
<211> 46
<212> PRT
<213> Bordetella bronchiseptica

<400> 8
Gln Arg Ala Thr Ile Arg Arg Gly Asp Ala Pro Ala Gly Gly Ala Val
  1               5                  10                     15

Pro Gly Gly Ala Val Pro Gly Gly Phe Gly Pro Leu Leu Asp Gly Trp
              20                  25                     30

Tyr Gly Val Asp Val Ser Asp Ser Thr Val Asp Leu Ala Gln
         35                  40                     45
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<210> 9
<211> 56
<212> PRT
<213> Bordetella bronchiseptica

<400> 9
Gln Arg Ala Thr Ile Arg Arg Gly Asp Ala Pro Ala Gly Gly Gly Val
 1   5   10   15

Pro Gly Gly Ala Val Pro Gly Gly Phe Asp Pro Gly Gly Phe Gly Pro
            20   25   30

Gly Gly Phe Gly Pro Val Leu Asp Gly Trp Tyr Gly Val Asp Val Ser
        35   40   45

Gly Ser Thr Val Glu Leu Ala Gln
    50   55

<210> 10
<211> 56
<212> PRT
<213> Bordetella bronchiseptica

<400> 10
Gln Arg Ala Thr Ile Arg Arg Gly Asp Ala Pro Ala Gly Gly Ala Val
 1   5   10   15

Pro Gly Gly Ala Val Pro Gly Gly Ala Val Pro Gly Gly Phe Gly Pro
            20   25   30

Gly Gly Phe Gly Pro Val Leu Asp Gly Trp Tyr Gly Val Asp Val Ser
        35   40   45

Gly Ser Ser Val Glu Leu Ala Gln
    50   55

<210> 11
<211> 61
<212> PRT
<213> Bordetella bronchiseptica

<400> 11
Gln Arg Ala Thr Ile Arg Arg Gly Asp Ala Pro Ala Gly Gly Ala Val
 1   5   10   15

Pro Gly Gly Ala Val Pro Gly Gly Phe Gly Pro Gly Gly Phe Gly Pro
            20   25   30

Gly Gly Phe Gly Pro Gly Gly Phe Gly Pro Val Leu Asp Gly Trp Tyr
        35   40   45

Gly Val Asp Val Ser Gly Ser Ser Val Glu Leu Ala Gln
    50   55   60

<210> 12
<211> 56

<212> PRT
<213> Bordetella bronchiseptica

<400> 12
Gln Arg Ala Thr Ile Arg Arg Gly Asp Ala Pro Ala Gly Gly Ala Val
 1   5   10   15

Pro Gly Gly Ala Val Pro Gly Gly Phe Gly Pro Gly Gly Phe Gly Pro
                20   25   30

Gly Gly Phe Gly Pro Val Leu Asp Gly Trp Tyr Gly Val Asp Val Ser
            35   40   45

Gly Ser Ser Val Glu Leu Ala Gln
     50   55

<210> 13
<211> 51
<212> PRT
<213> Bordetella bronchiseptica

<400> 13
Gln Arg Ala Thr Ile Arg Arg Gly Asp Ala Pro Ala Gly Gly Ala Val
 1   5   10   15

Pro Gly Gly Ala Val Pro Gly Gly Phe Gly Pro Gly Gly Phe Gly Pro
                20   25   30

Val Leu Asp Gly Trp Tyr Gly Val Asp Val Ser Gly Ser Ser Val Glu
            35   40   45

Leu Ala Gln
     50

<210> 14
<211> 49
<212> PRT
<213> Bordetella bronchiseptica

<400> 14
Gly Ala Lys Ala Pro Pro Ala Pro Lys Pro Ala Pro Gln Pro Gly Pro
 1   5   10   15

Gln Pro Gly Pro Gln Pro Pro Gln Pro Pro Gln Pro Pro Gln Arg Gln
                20   25   30

Pro Glu Ala Pro Ala Pro Gln Pro Pro Ala Gly Arg Glu Leu Ser Ala
            35   40   45

Ala

<210> 15
<211> 52
<212> PRT
<213> Bordetella bronchiseptica

<400> 15
Gly Ala Lys Ala Pro Pro Ala Pro Lys Pro Ala Pro Gln Pro Gly Pro
 1   5   10   15

Gln Pro Gly Pro Gln Pro Pro Gln Pro Pro Gln Pro Pro Gln Pro Pro
            20   25   30

Gln Arg Gln Pro Glu Ala Pro Ala Pro Gln Pro Pro Ala Gly Arg Glu
        35   40   45

Leu Ser Ala Ala
    50

<210> 16
<211> 59
<212> PRT
<213> Bordetella bronchiseptica

<400> 16
Gly Ala Lys Ala Pro Pro Ala Pro Lys Pro Ala Pro Gln Pro Gly Pro
 1   5   10   15

Gln Pro Gly Pro Gln Pro Gly Pro Gln Pro Gly Pro Gln Pro Pro Gln
            20   25   30

Pro Pro Gln Pro Pro Gln Pro Pro Gln Arg Pro Glu Ala Pro Ala Pro
        35   40   45

Gln Pro Pro Ala Gly Arg Glu Leu Ser Ala Ala
    50   55

<210> 17
<211> 52
<212> PRT
<213> Bordetella bronchiseptica

<400> 17
Gly Ala Lys Ala Pro Pro Ala Pro Lys Pro Ala Pro Gln Pro Gly Pro
 1   5   10   15

Gln Pro Gly Pro Gln Pro Gly Pro Gln Pro Pro Gln Pro Pro Gln Pro
            20   25   30

Pro Gln Arg Pro Glu Ala Pro Ala Pro Gln Pro Pro Ala Gly Arg Glu
        35   40   45

Leu Ser Ala Ala
    50

<210> 18
<211> 56
<212> PRT
<213> Bordetella bronchiseptica

<400> 18

Gly Ala Lys Ala Pro Pro Ala Pro Lys Pro Ala Pro Gln Pro Gly Pro
1   5   10   15

Gln Pro Gly Pro Gln Pro Gly Pro Gln Pro Pro Gln Pro Pro Gln Pro
            20   25   30

Pro Gln Pro Pro Gln Arg Gln Pro Glu Ala Pro Ala Pro Gln Pro Pro
        35   40   45

Ala Gly Arg Glu Leu Ser Ala Ala
    50   55

<210> 19
<211> 58
<212> PRT
<213> Bordetella bronchiseptica

<400> 19
Gly Ala Lys Ala Pro Pro Ala Pro Lys Pro Ala Pro Gln Pro Gly Pro
1   5   10   15

Gln Pro Gly Pro Gln Pro Pro Gln Pro Pro Gln Pro Pro Gln Pro Pro
            20   25   30

Gln Pro Pro Gln Pro Pro Gln Arg Gln Pro Glu Ala Pro Ala Pro Gln
        35   40   45

Pro Pro Ala Gly Arg Glu Leu Ser Ala Ala
    50   55

<210> 20
<211> 48
<212> PRT
<213> Bordetella bronchiseptica

<400> 20
Gly Ala Lys Ala Pro Pro Ala Pro Lys Pro Ala Pro Gln Pro Gly Pro
1   5   10   15

Gln Pro Pro Gln Pro Pro Gln Pro Pro Gln Pro Pro Gln Arg Gln Pro
            20   25   30

Glu Ala Pro Ala Pro Gln Pro Pro Ala Gly Arg Glu Leu Ser Ala Ala
        35   40   45

<210> 21
<211> 52
<212> PRT
<213> Bordetella bronchiseptica

<400> 21
Gly Ala Lys Val Pro Pro Ala Pro Lys Pro Ala Pro Gln Pro Gly Pro
1   5   10   15

Gln Pro Pro Gln Pro Pro Gln Pro Pro Gln Pro Pro Gln Pro Gln Pro
            20   25   30

Gln Pro Gln Pro Glu Ala Pro Ala Pro Gln Pro Pro Ala Gly Arg Glu
      35   40   45

Leu Ser Ala Ala
      50

<210> 22
<211> 54
<212> PRT
<213> Bordetella bronchiseptica

<400> 22
Gly Ala Lys Val Pro Pro Ala Pro Lys Pro Ala Pro Gln Pro Gly Pro
 1   5   10   15

Gln Pro Pro Gln Pro Pro Gln Pro Pro Gln Pro Pro Gln Pro Gln Pro
              20   25   30

Gln Pro Gln Pro Gln Pro Glu Ala Pro Ala Pro Gln Pro Pro Ala Gly
      35   40   45

Arg Glu Leu Ser Ala Ala
      50

<210> 23
<211> 42
<212> PRT
<213> Bordetella bronchiseptica

<400> 23
Gly Ala Lys Ala Pro Pro Ala Pro Lys Pro Ala Pro Gln Pro Gly Pro
 1   5   10   15

Gln Pro Pro Gln Pro Pro Gln Pro Gln Pro Glu Ala Pro Ala Pro Gln
              20   25   30

Pro Pro Ala Gly Arg Glu Leu Ser Ala Ala
          35   40

<210> 24
<211> 39
<212> PRT
<213> Bordetella bronchiseptica

<400> 24
Gly Ala Lys Ala Pro Pro Ala Pro Lys Pro Ala Pro Gln Pro Gly Pro
 1   5   10   15

Gln Pro Pro Gln Pro Gln Pro Glu Ala Pro Ala Pro Gln Pro Pro Ala
              20   25   30

Gly Arg Glu Leu Ser Ala Ala
          35

<210> 25

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<211> 5
<212> PRT
<213> Artificial

<220>
<221> MISC_FEATURE
<222> (3)..(4)
<223> Xaa can be any amino acid

<400> 25
Gly Gly Xaa Xaa Pro
  1               5
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